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TRAINING OF TECHNICAL STAFF AND MANAGERS



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FOREWORD

The purpose of *Training of Technical Staff and Managers* is to provide guidance to DOE staff and contractors that can be used as an aid in the design and development of a facility's technical staff and managers' training program. Users are not obligated to adopt all or any parts of this document. Rather, they can selectively use the information to establish or improve facility training programs as applicable.

Beneficial comments (recommendations, additions, deletions) and any pertinent data that may improve this document should be addressed in the Comments Section of this forum.

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1. INTRODUCTION

1.1 Purpose

Training programs at Department of Energy (DOE) facilities should prepare personnel to safely and efficiently operate the facilities in accordance with DOE requirements. This guide contains information that can be used to develop or validate training programs for technical staff and managers at DOE nuclear facilities. Training programs based on the content of this guide should provide assurance that these personnel perform their jobs safely and competently.

1.2 Background

DOE and various DOE contractors identified a need for guidance regarding training programs for technical staff and managers. *Training of Technical Staff and Managers* was developed on the basis of requirements of DOE orders and on DOE and nuclear industry operating experience.

1.3 Application

DOE Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities* contains training program content requirements for nuclear facility operating organization personnel, including technical staff, managers, and supervisors. Facilities should use the information in the Technical Staff section of this document for the development of training programs to support these positions. The Order also requires that managers and supervisors participate in the portions of the technical staff training program as applicable to their jobs. Therefore, manager training programs are also included to assist in the revision or development of these programs.

Sections 2, 3, and 6 through 8 contain information that applies equally to training programs for both technical staff and manager training programs. Section 4 contains training program information for the technical staff, and Section 5 contains training program information for managers.

The information in this document may be used in both initial and continuing training programs.

Full implementation of quality training requires a long-term commitment. Training activities should be carefully managed to produce effective results. Plans should be developed, organizations should be staffed with qualified instructors, and sufficient controls should be applied to ensure delivery of an effective training program.

Each facility should analyze its training needs to develop a facility-specific training program. Analysis results should be used to establish learning objectives, test items, instructional methods, and instructional settings. Performance measures used to evaluate employee performance and assess training effectiveness can also be derived from the analysis. Users may develop training programs for each discipline that meets facility-specific needs by selectively applying this guide.

Training programs should be evaluated on a regular basis to determine the extent to which established learning objectives are being accomplished. Evaluation results should be used to improve training plans, facilities, programs, materials, and procedures. In addition, a systematic method should be implemented to update training program content as a result of facility modifications, operating experiences, procedure changes, and changes in job requirements.

2. GOALS

2.1 Initial Training

The goal of initial training is to supplement position-specific education, experience, and training in order to familiarize technical staff and managers with facility-specific information. This enhances their ability to perform assigned duties in a manner that promotes safe and reliable nuclear facility operations.

2.2 Continuing Training

The goal of the continuing training program is to ensure that technical staff personnel and managers maintain and improve their skills, are cognizant of nuclear facility physical and procedural modifications, changes to DOE and regulatory requirements, and lessons learned from industry and facility-specific operating experience that affect their job performance. Review of important but infrequently used knowledge areas and the development of broader scope and depth of job-related skills and knowledge are also goals of a continuing training program.

2.3 Exceptions

Personnel already proficient in subject material may be excepted from training. Exception refers to the release of an individual from portions of a training program on the basis of the individual's experience, education, and training that is related to the particular job. Even though the training program (or portion thereof) is being excepted, the requisite examinations to establish qualification should be completed. In all cases, the facility should ensure that sufficient facility-specific training is provided to the individual to enable him/her to perform the job requirements in a safe and efficient manner.

DOE contractors should establish procedures and criteria to administer and document exceptions to initial and continuing training requirements. These procedures should contain specific direction regarding the process to be used to except persons from training program requirements. When considering an individual for exception to training requirements, the employee's prior training, education, and job experience should be reviewed. This review may be by line management or it may be through the use of review groups or committees.

Regardless of the method used to arrive at the decision to except an individual from training, the justification should be fully documented and included as a part of the person's training record.

Individuals who believe that they have knowledge or skills equivalent to that which is addressed by the training may challenge the requirement to attend individual portions of the training program. In situations such as these, examinations (written or performance) may be administered. If challenge examinations are administered, they should be sufficiently comprehensive to adequately test the learning objective(s) that are stated in the training program. The use of challenge tests is not considered taking an exception to the training and, as such, challenge tests are administered somewhat differently than exceptions, which are discussed in preceding portions of this Section. Accordingly, they are typically administered locally and do not need to be justified on a case-by-case basis when used in place of attending training for technical staff and managers.

3. QUALIFICATION REQUIREMENTS

Qualification programs should be developed that include the elements identified in DOE Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*.

4. TRAINING PROGRAM FOR TECHNICAL STAFF PERSONNEL

The training described in this Section should be provided in the sequence outlined. Because this information is provided for use at all DOE nuclear facilities (reactor and non-reactor) some of the topics may not apply at all facilities. Only the topics that have applicability should be considered for inclusion in training programs for technical staff personnel.

This guide divides the technical staff training into ten modules:

- Initial training
- Staff assignment training
- Facility reference materials
- Applied fundamentals
- Nuclear codes, standards, and regulations
- Theory of process control systems
- Facility systems and components
- Facility operations
- Simulator training
- Probabilistic Risk Assessment

4.1 Initial Training

New technical staff personnel and managers should be provided guidance and training designed to familiarize them with nuclear facility activities. The initial training period should enable the trainee to become familiar with the following:

- Facility and corporate organization
- Nuclear cycle overview, including a description of the mission of other DOE fuel and weapons facilities
- Facility fundamentals (as applicable)
 - heat transfer, fluid flow, and thermodynamics
 - electrical science
 - nuclear physics
 - chemistry/chemistry controls
 - process controls

- material science
- Facility systems and components
- Facility operations
- Facility simulator training (as appropriate)
- DOE Orders and directives
- Codes and standards overview
- Quality assurance and quality control practices
- Facility document system
- Facility policies and practices regarding planning and scheduling activities
- Material, maintenance, and modification control
- As-Low-As-Reasonably-Achievable (ALARA) practices
- Radioactive waste reduction program
- Nuclear criticality control.

4.2 Staff Assignment Training

Following completion of the first module, initial training, and prior to entering the facility-specific training program, technical staff personnel new to nuclear facilities should be assigned to the department for which they were hired. This period generally should be devoted to on-the-job training with emphasis placed on familiarizing the individual with job responsibilities. Guidelines should be provided to ensure that key elements of the job are addressed during this training phase.

Additionally, it is recommended that the individual be temporarily assigned to work with other departments (such as shift assignments with maintenance and operations) to develop some knowledge of overall facility operation and interdepartmental relationships. Productive work assignments should be tasks for which the individual is qualified.

4.3 Facility Reference Materials

The purpose of this module is to enable the trainee to locate and use the following:

- Facility Technical Safety Requirements (Technical Specifications/Operational Safety Requirements)
- Facility Safety Analysis Reports

- Vendor manuals
- Facility drawings (preliminary and as-built)
- Design and/or contract specifications
- Routine facility reports
- Design change procedures
- Facility operation records
- Facility security program
- Industrial safety program
- Radiation protection and ALARA practices
- Purchasing and stores procedures
- Facility procedures controlling conduct of operations
- Quality Assurance Manual
- Facility and departmental administrative procedures.

4.4 Applied Fundamentals

The purpose of this training module is to teach the nuclear facility applications of subjects that are often taught from a highly theoretical viewpoint.

Instruction should provide technical staff trainees with the requisite heat transfer, fluid flow, and thermodynamics knowledge and skills to perform the following, as applicable to the facility:

- Explain basic thermodynamic principles such as the following:
 - temperature, specific heat, and sensible heat
 - latent heat of vaporization and condensation
 - properties of water and steam
 - properties of liquids, gases, and gas-liquid interfaces
 - heat transfer mechanisms
- Explain the basic principles of fluid flow
 - pump theory
 - cavitation
 - fluid flow in a closed system

- heating a closed system
- draining a closed system
- filling and venting of systems
- Use tabular data and charts to analyze nuclear facility machinery
- Explain in general terms how and why component and system performance tests are conducted
- Explain the method and the reasons for a reactor heat balance to calibrate power range neutron detectors
- Explain the theory and application of flow metering elements such as orifice plates, nozzles, and venturi tubes
- Discuss and use pump performance curves
- Define and compute net positive suction head for an installed pump
- Explain and use logarithmic mean temperature difference for shell and tube heat exchangers
- Discuss heat transfer in fuel rods and to the reactor coolant
- Discuss departure from nucleate boiling and departure from nucleate boiling ratio in reactors
- Define and explain the use of hot channel factors
- Discuss effects of subcooling and of sudden changes in pressure and velocity on reactor heat transfer
- Discuss the safe operating envelope
- Explain relationship of compression, expansion, heat transfer, temperature, and pressure in gases and in vapors.

Instruction should provide technical staff trainees with the requisite electrical science knowledge and skills to perform the following:

- Explain basic ac and dc electrical theory such as:
 - sources of electrical power
 - electrical loads
 - fundamental electrical laws
 - electrical hazards and safety
 - basic electrical circuits

- electrical grounds
- single-phase and multi-phase circuits and power distribution
- Identify heat sources and describe methods of cooling motors, generators, buswork, and transformers
- Describe various devices and components common to motor control centers
Describe the purpose of and explain the theory of operation of circuit protection devices
- Describe the purpose of and explain the theory of operation of generator and transformer protective devices.

Instruction should provide technical staff trainees with the requisite electronics fundamentals knowledge and skills to perform the following:

- Describe the function and principles of operation of the following:
 - facility process computer
 - facility high-speed data acquisition systems
- Describe the principle of operation and failure mechanisms of the following electronic equipment:
 - diodes
 - light-emitting diodes
 - optical couplers
 - transistors
 - bistables
 - logic circuits
 - time-delay circuits
 - piezoelectric devices

Instruction should provide technical staff trainees with the requisite instrumentation and control fundamentals knowledge and skills to perform the following:

- Describe the principles of operation, typical application, and failure modes of the following detectors and instrument strings:
 - bourdon tube pressure/differential pressure detector
 - force balance transmitter
 - bubbler system level detector

- float-type level detector
- buoyancy-type level/differential pressure detector
- manometer-type level/differential pressure detector
- venturi flow detector
- orifice flow detector
- rotameter
- pitot tube flow detector
- sonic flow meter
- pressure/pressure switches
- bimetallic temperature detector
- filled system temperature detector
- resistance temperature detector
- thermocouple
- pyrometer
- Describe the failure modes of the following valve operators:
 - pneumatic diaphragm
 - motor
 - piston
 - solenoid
 - hydraulic
- Describe the application of wet and dry reference legs and state their failure modes
- Describe the effect of environmental conditions on facility instrumentation.

Instruction should provide technical staff trainees with the requisite knowledge of nuclear physics principles to explain the following:

- Criticality control
- Nuclear cross sections
- Fission process and chain reaction
- Prompt and delayed neutrons
- Reactivity coefficients

- Reactivity control methods
- Poison effects
- Power distribution and peaking factors
- Fuel cycles
- Fuel management

Instruction should provide technical staff trainees with the requisite reactivity control and fuel behavior (reactor facilities only) knowledge and skills to perform the following:

- Describe the effects of the following on control rod worth:
 - axial position of the rod in the core
 - radial position of the rod in the core
 - relative rod position
 - boron concentration
 - moderator temperature
 - core exposure
 - fuel temperature
 - void concentration
 - local thermal neutron flux
- Describe the effect of operating the control- and power-shaping rods both inside and outside specified control bands for varying facility conditions
- Describe the core parameters that affect the following coefficients and evaluate how changes in these coefficients affect facility operations:
 - moderator temperature coefficient
 - Doppler coefficient
 - power Doppler coefficient
 - power defect
 - pressure coefficient
 - void coefficient
- Evaluate the impact of decay heat generation on post-trip operations for varying facility conditions
- Describe the bases for limits on power escalation and dissension

- Calculate reactivity balance, critical rod position, shutdown margin, and inverse count-rate ratios (1/m)
- Determine the effect of poison concentration and loading on reactivity control and fuel management for the following:
 - fission product poisons
 - burnable poisons
 - nonburnable poisons
- Determine the effect of each of the following on reactivity control and facility operations:
 - thermal hydraulic limits
 - linear heat generation rates
 - minimum critical power ratio
 - average planar linear heat generation rate
 - peaking factors
- Evaluate the effect of the following on reactivity control and facility operations:
 - unbalanced core flow
 - recirculation flow changes
 - control rod movements
 - natural circulation
 - thermal-hydraulic instabilities
 - main generator load changes
 - inadvertent changes in burnable poison concentration
 - xenon and samarium concentration
- Discuss the ways to prevent, identify, and mitigate operation with failed fuel.

Instruction should provide technical staff trainees with the requisite knowledge of nuclear facility chemistry to explain the following:

- Types of corrosion and methods of corrosion control
- Basics of radiochemistry
- Terms such as conductivity, dissolved solids, dissolved oxygen, silica, chlorides, and fluorides
- Principles of ion exchange and water treatment

- Chemical effects of boron
- Chemistry limits and their bases
- Potential chemical contaminants from maintenance activities
- Chemistry indications of a degraded core/process
- Process chemistry
- Conversion of uranyl nitrate to uranium hexafluoride
- Fluorine generation and disposal
- Properties of uranium hexafluoride
- Reduction of uranium trioxide to uranium dioxide
- Plutonium purification by ion exchange
- Ion exchange equipment
- Purposes and uses of fluidized beds in fuel processing
- Purposes and uses of extraction systems and denitrators.

Instruction should provide technical staff trainees with the requisite knowledge of materials sciences to explain the following:

- Facility materials selection and applications
 - bases for material selection
 - limitations of materials used
 - applications of materials
- Brittle fracture
 - characteristics of brittle fracture
 - minimum pressurization temperature
 - nil ductility transition temperature
 - heatup and cooldown limitations
 - irradiation effects
- Facility material problems and concerns
 - fuel and cladding
 - pressure vessel
 - piping

- heat exchangers
- turbines
- valves and pumps
- Basic stress and strain relationships
- Fracture mechanics and failure modes
- Irradiation effects on plant materials, including safety-related instrumentation
- Imperfections in materials
 - life limiting
 - detection (nondestructive testing)
 - crack initiation and growth analysis
- Heat treatment of metals
- Corrosion and erosion effects
- The term "pressurized thermal shock" and its application to facility operating conditions
- Causes and potential consequences of water hammer and thermal shock
- Application of pipe restraints and snubbers in a nuclear facility.

Instruction should provide Shift Technical Advisor (STA) trainees with the requisite mechanical equipment operating fundamental knowledge and skills to perform the following:

- Identify the major components of the most common facility valves
- Identify the basic valve types from symbols used in mechanical drawings
- Describe the principle of operation of the following types of valves:
 - relief valves
 - gate valves
 - globe valves
 - ball valves
 - needle valves
 - pressure and back-pressure regulating valves
 - butterfly valves
 - check valves

- Describe the principle of operation of the following types of valve operators:
 - motor operators
 - solenoid operators
 - hand operators
 - hydraulic operators
- Describe how to check the position of remotely operated and manually operated valves
- Describe the principles of operation of the following equipment:
 - heat exchangers
 - filter demineralizers
 - diesel generators
- Describe the operating precautions associated with facility diesel generators and operating practices that could lead to degraded diesel generator performance
- Describe the principle of operation of the following types of pumps:
 - reciprocating positive displacement
 - rotary positive displacement
 - jet
 - centrifugal
 - axial flow
 - mixed flow

Instruction should provide STA trainees with the requisite radiation and radiological protection fundamentals knowledge and skills to perform the following:

- Describe the operating principle of the following types of radiation detection instruments and explain when each detector should be used:
 - ionization chamber
 - proportional counter
 - Geiger-Mueller tube
 - scintillation
- State the purpose and functions of the criticality, process, airborne, and area radiation monitors in the facility radiation monitoring system

- State the types of monitors used at the facility and the characteristics of the detectors used
- Evaluate abnormal operation indications on the facility radiation monitoring system to determine possible causes
- Predict radiation monitoring system response during emergency conditions.

4.5 Nuclear Codes, Standards, and Regulations

The purpose of this module is to give the trainee a working knowledge (as appropriate for the job) of the following:

- Appropriate codes and standards
- Environment, Safety, and Health Orders and other applicable DOE Orders
- Identification and use of applicable regulatory guides
- Quality assurance and quality control.

4.6 Theory of Process Control Systems

The purpose of this module is to enable the trainee to explain the following:

- Print symbology
- Control wiring diagrams and logic diagrams
- Basic control loops
- Proportional, reset, and derivative control action
- Basic automatic control, set points, and feedback
- Primary and secondary elements
- Transducers, transmitters, and controllers
- Final control elements.

4.7 Facility Systems and Components

The purpose of this module is to enable the trainee to explain the design purpose of facility systems and components, major precautions and limitations for their use, interactions with other systems, and to locate major systems and components. Trainee interest may be enhanced if this section includes an explanation of design considerations and system walk-throughs. Systems and component training should include those essential to facility safety and efficiency such as.

- Explain the purpose of each system/process
- List major precautions and limitations
- Describe interaction with other systems
- Describe integrated system operation.

4.8 Facility Operations

The purpose of this module is to enable the trainee to apply the following topics (assignments in the facility or use of simulators may reduce the time required for and increase the effectiveness of this instruction):

- Selected normal, abnormal, and emergency operating procedures
- Major steps in startup and shutdown
- Various facility or reactor operational modes
- Planning and management of scheduled maintenance periods
- Facility Technical Safety Requirements and how they are used
- General categories of design bases for accident analyses
- Facility parameters that will initiate reactor/process trip
- Actions necessary to recover from a reactor/process trip
- Major steps in refueling, including post-refueling tests
- Departmental responsibilities and authorities and interdepartmental interfacing
- ALARA program and work planning to minimize personnel radiation exposure
- Importance of maintenance to safe and reliable facility operation
- Coordination of maintenance and test activities with the operations department
- Process of procedure revision, both temporary and permanent.

4.9 Simulator Training (Category-A Reactors Only)

The simulator training program should be structured to meet the needs of the individual. It should be designed to improve overall knowledge of equipment operation and develop a better understanding of transients and accident sequences. Not all technical staff positions need simulator training. Emphasis should be placed on understanding facility characteristics and controls rather than on developing control manipulation skills (not a certification program).

4.10 Probabilistic Risk Assessment

For those facilities for which a Probabilistic Risk Assessment (PRA) has been performed, initial and continuing training programs should include the principal results of the PRA. The training should address the following:

- The importance of facility systems in preventing damage or severe accidents
- The probabilistic basis for defining magnitudes and compositions of potential releases of radionuclides (or other toxic materials) and consequences of potential releases in terms of facility worker and offsite population health effects
- Dominant types of potential operational accidents as defined in terms of frequency and consequences
- Locations of all significant amounts of radioactive and other hazardous materials, and measures to prevent their release
- The importance of maintaining operational limits and conditions, and the consequences of violating those limits
- Identification of potential hardware failures and human errors which constitute dominant contributors to important accident sequences
- The role PRA can play in optimizing operating limits, Technical Safety Requirements, testing, and maintenance intervals
- The role of external events such as earthquakes, extreme winds, flooding, transportation accidents, etc., in terms of their contribution to facility risk
- The role PRA can play in evaluating proposed changes in operating procedures or equipment configuration

4.11 Teamwork and Diagnostic Skills

Critical to the success of the technical staff is the ability to systematically apply knowledge and skills to complete assigned tasks. Technical staff must possess the necessary knowledge and skills to monitor facility data, determine if facility response is as expected, and recommend intervention activities when required to contribute effectively as members of the operations team during both normal and off-normal facility conditions. To enable technical staff to function as team members and fulfill the technical staff function, training should be provided in teamwork and diagnostic skills.

Training provided to technical staff trainees in teamwork should provide the requisite knowledge and skills to perform the following:

- Demonstrate and promote effective communications, using both verbal and nonverbal methods
- Interact effectively with team members
- Provide coaching to team members to achieve team goals
- Contribute to the resolution of conflicts within the control room team and with interfacing organizations
- Respond effectively to different leadership systems
- Recognize and mitigate individual stress.

Training provided to technical staff trainees in diagnostics should provide the requisite knowledge and skills to perform the following:

- Recognize the importance of attention to detail and the early recognition of problems
- Monitor facility data and detect impending facility problems
- Identify facility conditions requiring action
- Differentiate between actual and expected facility conditions
- Determine expected facility response in abnormal transients and identify deviations
- Identify potential causes of problems
- Analyze potential causes of problems to identify the most probable cause(s)
- Prioritize facility problems using a systematic process
- Evaluate success of corrective action and respond accordingly.

Further discussion of this subject is provided in *Teamwork Training and Diagnostic Skills Development* (available in the Continuing Training Good Practices Forum).

5. TRAINING PROGRAM FOR MANAGERS

A training program for managers and first-line supervisors has been included as a separate Section of this guide because DOE Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities* contains training program content requirements for managers and supervisors. DOE Order 426.2 also requires that managers participate in the portions of the technical staff training program appropriate to their job responsibilities.

In addition, the Order requires that managers receive training appropriate to their positions. The training goal should be to aid the individual in making the transition from a technical position to a managerial one and to contribute to job performance. Learning objectives from the topics in this Section should be included in the program as appropriate to the position.

The training program for managers is organized in modules. The training described in this Section may be provided in any sequence. Because this information is intended for use at all DOE nuclear facilities (reactor and non-reactor) some of the topics may not apply at all facilities. Only the topics that have applicability should be considered for inclusion in training programs for managers.

5.1 Supervisory Skills Training

The purpose of this module is to aid the individual's transition to management. Training should achieve the following:

- Prepare the individual for increased administrative responsibilities in areas such as:
 - delegation of work
 - efficient recordkeeping
 - recordkeeping systems and requirements
 - time management
 - labor relations
 - expanding understanding of the management system, its interrelationships, and its lines of communication
 - understanding the goals and objectives concept
 - ascertaining when and to what degree management involvement in work of subordinates is appropriate
 - fitness for duty procedures

- ethics
- effective interviews
- administrative policies and procedures
- supervisory responsibilities and limits
- Prepare the individual to cope with personnel matters in areas such as:
 - staffing issues
 - motivation of personnel and creating a motivating work atmosphere
 - dealing with differing personalities
 - establishing and demonstrating standards of job performance
 - using performance appraisal systems effectively
 - providing career counseling
 - conflict resolution
 - dealing with chronic and acute stress
 - dealing effectively with subordinates
- Improve the individual's communication skills in areas such as:
 - interpersonal communication
 - oral and written communications
 - praising and reprimanding
 - directing
 - listening
 - public speaking and speeches
 - conducting meetings
 - conducting shift briefings
- Enhance the individual's ability to make decisions in areas such as:
 - problem analysis and decision-making
 - establishing priorities
 - predetermining alternatives for normal and emergency operations
 - anticipating and responding to stress-induced reactions
 - planning and organizing

5.2 Management Training

In addition to the supervisory skills training, the following modules should be considered for inclusion in the management training program.

The purpose of the quality assurance (QA) and quality control (QC) module is to enable the manager to effectively manage the activities of his/her particular area of responsibility consistent with the facility's policies and procedures regarding quality issues. Training may include topics such as the following:

- Corporate QA policies
- Facility procedures for implementation of the policies
- Appropriate regulatory requirements regarding QA and QC
- Department-level QC responsibilities.

The purpose of the facility security and emergency plans module is to enable the manager to perform effectively and to provide reasonable assurance that subordinates will do likewise in the event of threats or breaches to security and on- or off-site emergencies. Training may include topics such as the following:

- Security threats and breaches
 - the security system
 - security plans and procedures
 - reporting requirements
 - investigative responsibilities
- Natural disasters
 - procedures for coping with tornados, earthquakes, floods, or other natural disasters
- Facility fires
 - pre-fire plans
 - fire brigade organization and responsibilities
 - off-site firefighting support
 - applicable codes and standards related to fire prevention and protection
 - facility Technical Safety Requirements associated with fire prevention, detection, and protection
 - transient fire loads

- fire prevention work control procedures
- Radiological emergencies, on-site and off-site
 - position responsibilities during an emergency
 - department, group, or facility responsibilities (as applicable)
 - classification of emergencies
 - applicable DOE orders and directives
 - applicable federal regulations
 - state requirements and plans
 - reporting requirements
 - local organization commitments and plans
 - handling of contaminated injuries
 - off-site support groups (facility and/or contracted emergency support)
 - overall emergency plan, including action steps, support, and data collecting and gathering systems, such as computers and environmental monitoring systems
 - public and media information plan, including news releases,
 - philosophies, facilities, and specific responsibilities

The purpose of the purchasing module is to enable managers to work effectively when purchasing materials and contracting services. Topics for training may include the following:

- Policies and procedures related to purchasing and materials
- Purchasing services available at the facility
- Contract approval requirements
- QA and QC requirements relative to purchasing
- Classifications of material purchases
- Provisions for expediting purchases
- Storage requirements
- Applicable standards and regulatory requirements related to materials stores
- Environmental qualification requirements and processes.

The purpose of the material storage module is to enable the manager to function effectively regarding material storage procedures and practices and the distribution of materials and parts into the facility for use. Topics for training may include the following:

- Policies and procedures
- Applicable standards and regulatory requirements
- Facility and/or department policies regarding spare parts inventory
- Facility policies regarding material procurement from facility stores
- Facility policies regarding disposal of used or outdated parts and components.

The purpose of the facility modifications module is to enable the manager to plan, obtain approval for, and implement facility modifications in accordance with approved facility policies and procedures. Topics for instruction may include the following:

- Policies and procedures
- Facility Technical Safety Requirements
- Modification implementation procedures
- Quality control requirements
- Determination of what constitutes a modification
- Replacement parts and component requirements (equal to or better concept)
- Post-modification activities, such as testing, drawing update, procedure changes, and training.

The purpose of the nuclear, industrial, and radiation safety module is to enable the manager to understand and effectively manage the safety requirements as defined by applicable DOE orders and directives.

- Safety Analysis Reports
- Job safety analyses
- Handling of safety matters
- Industrial safety program
- Applicable DOE orders
- ALARA program
- Occurrence Reports.

The purpose of the interfacing with external groups and organizations module is to enable the manager to interface with non-facility groups and/or other external

organizations in accordance with established facility policies and procedures. Topics for instruction may include the following (some topics listed may only apply to multi-facility sites and/or facilities still under construction):

- Corporate organization (whether on-site or off-site)
- Lines of communication appropriate to the managerial position
- Corporate policies concerning industrial safety and hiring practices
- Department of Energy and other federal agencies
- Corporate-level goals and objectives
- Working relationships with contractors and vendors
- Resolution of contractual problems
- Policies and procedures regarding transfer of equipment from the construction organization to the operations organization
- Facility interfacing procedures at multi-facility sites when one or more facilities are operating and one or more are under construction or reconstruction
- Inactive equipment layup and storage following transfer to the operating organization
- Environmental issues

The purpose of the budgeting module is to enable the manager to use the budget system to achieve department, group, or facility goals and objectives. Topics for instruction may include the following:

- Budget planning and preparation
- Achievement of established goals and objectives through budgeting
- Prioritization of goals and objectives for a budget ceiling
- Budget review and approval process
- Implementation of a periodic budget review system
- Preparation and submittal of budget change requests.

The purpose of the public relations and news releases module is to enable managers to function in accordance with established policies and procedures in public relations and news release matters. Instruction may include the following topics:

- Applicable policies and procedures
- Review and approval process for public speeches and presentations

- Individual responsibilities in dealing with public sectors and groups
- Responsibilities for review, approval, and presentations to professional organizations, educational institutions, community groups, and the media

6. CONTINUING TRAINING

The frequency of continuing training should be on a biennial cycle and should be based on job performance. Continuing training in technical and administrative subjects should be provided to help ensure that technical staff personnel and managers maintain and improve their job proficiency. Specific areas that should be part of a continuing training program include, but are not limited to, the following:

- Changes to applicable facility procedures, codes, and standards
- Significant facility systems, components, and equipment changes
- Facility and industry operating experience
- Changes to Technical Safety Requirements
- Abnormal and emergency procedures
- Selected topics from the initial training program to correct identified weaknesses and performance problems
- Selected fundamentals with emphasis on seldom-used knowledge and skills necessary to assure safety
- Lessons learned and near miss events
- Topics requested by technical staff or management.

During evaluations of training program effectiveness, areas for training opportunities may be identified. When performance deficiencies or training weaknesses are noted, the continuing training program can serve to upgrade the skills and knowledge level of the position incumbent. For further guidance in developing, implementing, and evaluating a continuing training program, refer to the DOE-HDBK-1118-99, *Guide to Good Practices for Continuing Training*.

Documentation indicating the participation and performance of technical staff and managers in the continuing training program should be maintained in a form that can readily be audited by internal and external review committees and teams.

7. EVALUATION

7.1 Trainee Evaluation

The quality of training programs, course content, and instructional mode is best evaluated by the performance of the trainee after the training has been completed. The best measurement of program effectiveness is to require the trainees to demonstrate the knowledge and skills associated with the subject materials. Successful completion of examination(s) on modules in Section 4 will indicate that the trainee has an adequate understanding of the course. The effectiveness of the training in Section 5 may be better evaluated by interviews and observation of job performance.

7.2 Program Evaluation

To establish and maintain an effective program, periodic or continuing evaluation is necessary. An important aspect of this evaluation is communication among members of the training organization, departmental supervisors, and the trainees to promote program updating and improvements. Consideration should be given to the following items:

- Trainee examination results
- Employee job performance related to the program topics
- Regulations and standards affecting this program

Necessary changes to the program content, instructional materials, training methods, examination techniques, training facilities, or instructional staff should be identified to designated management representatives. Responsibility for initiating and following corrective actions should be assigned.

8. PROGRAM RECORDS

Auditable records of each individual's participation and performance in, or exception(s) granted from, the training program(s) should be maintained. Individual training records should include the following (as appropriate):

- Education, experience, employment history, and most recent health evaluation summary
- Training programs completed and qualification(s) achieved
- Lists of questions asked and the examiners' overall evaluation of responses on oral examinations
- Correspondence relating to exceptions granted to training requirements (including justification and approval)
- Records of qualification for one-time-only special tests or operations
- Attendance records for required training courses or sessions
- Latest completed checklists, graded written examinations (with answers corrected as necessary or examination keys) used for qualification. Some facilities may prefer to maintain a separate file of completed examinations with answer keys for each individual, since inclusion of the examinations with the answer key requires controlled access to training records to maintain examination security.

A historical record that documents initial qualifications on each position qualified should be maintained as part of individual training records. For example, if an individual initially qualified in 1986, the record should have the date and name of the qualification entered into it. If more than one qualification is achieved and maintained, the individual training record should contain documentation to that effect.

For presently held qualification(s), the completed examinations, checklists, etc., should be maintained on record. When an individual holds qualification on multiple positions, records that support current qualifications for each position should be maintained. Duty area or task qualification should be documented using a similar method (for facilities/positions that use duty area or task qualification instead of position qualification).

Upon requalification, records that supported the previous qualification may be removed from the record and replaced with the information documenting present qualification.

Superseded information should be handled in accordance with DOE-O-243.1B AC-1, *Records Management Program*.